

EDITORIAL BOARD

*ARCHIVE*  
for  
**RATIONAL MECHANICS**  
*and*  
**ANALYSIS**

*Edited by*

**S. S. ANTMAN**

*Volume 143*



**Springer**  
1998

All articles published in this journal are protected by copyright, which covers the exclusive rights to reproduce and distribute the article (e.g., as offprints), as well as all translation rights. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, video disks, etc., without first obtaining written permission from the publisher. Authors publishing in this journal can, under certain conditions, benefit from library and photocopy fees collected by VG WORT. Authors of German nationality and those resident in the Federal Republic of Germany, as well as citizens of Austria, Switzerland and member countries of the European Community, may apply to Verwertungsgesellschaft WORT, Abteilung Wissenschaft, Goethestraße 49, D-80336 München/Germany, for detailed information. According to § 4 section 3 of the German Postal Services Data Protection Regulations, if a subscriber's address changes, the German Federal Post Office can inform the publisher of the new address even if the subscriber has not submitted a formal application for mail to be forwarded.

Subscribers not in agreement with this procedure may send a written complaint to Springer-Verlag, Heidelberger Platz 3, D-14197 Berlin/Germany within 14 days of publication of this issue.

Die Zeitschrift sowie alle in ihr enthaltenen einzelnen Beiträge und Abbildungen sind urheberrechtlich geschützt. Jede Verwertung, die nicht ausdrücklich vom Urheberrechtsgebot zugelassen ist, bedarf der vorherigen schriftlichen Zustimmung des Verlages. Das gilt insbesondere für Vervielfältigungen, Bearbeitungen, Übersetzungen, Mikroverfilmungen und die Einspeicherung und Verarbeitung in elektronischen Systemen. Fotokopien für den persönlichen und sonstigen eigenen Gebrauch dürfen nur von einzelnen Beiträgen oder Teilen daraus als Einzelkopien hergestellt werden.

Jeder Autor, der Deutscher ist oder ständig in der Bundesrepublik Deutschland lebt oder Bürger Österreichs, der Schweiz oder eines Staates der Europäischen Gemeinschaft ist, kann unter bestimmten Voraussetzungen an der Ausschüttung der Bibliotheks- und Fotokopientantiemen teilnehmen. Nähere Einzelheiten können direkt von der Verwertungsgesellschaft WORT, Abteilung Wissenschaft, Goethestraße 49, D-80336 München/Germany, eingeholt werden.

Hinweis gemäß § 4 Abs. 3 der Postdienst-Datenschutzverordnung: Bei Anschriftenänderung des Beziehers kann die Deutsche Bundespost Postdienst dem Verlag die neue Anschrift auch dann mitteilen, wenn kein Nachsendeantrag gestellt ist.

Hiergegen kann der Bezieher innerhalb von 14 Tagen nach Erscheinen dieses Heftes bei unserer Berliner Verlagsanschrift (Springer-Verlag, Heidelberger Platz 3, D-14197 Berlin/Germany) widersprechen.

Springer-Verlag Berlin Heidelberg New York London Paris Tokyo  
Hong Kong Barcelona Budapest  
© Springer-Verlag Berlin Heidelberg 1998 – Printed in Germany

## EDITORIAL BOARD

J. M. BALL Mathematical Institute, University of Oxford, 24–29 St Giles,  
Oxford OX1 3LB, UK. (ball@maths.ox.ac.uk)

H. BREZIS Analyse Numerique, Tour 55–65, 5 etage, Universite P. et M. Curie,  
4, pl. Jussieu, 75252 Paris Cedex 05, France. (brezis@ann.jussieu.fr)

B. D. COLEMAN Rutgers University, Graduate Program in Mechanics,  
98 Brett Road, Piscataway, NJ 08854-8058, USA.  
(bcoleman@stokes.rutgers.edu)

C. M. DAFLEROS Division of Applied Mathematics, Brown University, Providence, RI 02912,  
USA.

M. GOLUBITSKY Department of Mathematics, University of Houston,  
Houston, TX 77204-3476, USA. (mg@uh.edu)

M. E. GURTIN Department of Mathematics, Carnegie-Mellon University, Pittsburgh,  
PA 15213-3890, USA. (mg0c@andrew.cmu.edu)

P. J. HOLMES Princeton University, Program in Applied and Computational Mathematics,  
Fine Hall, Washington Road, Princeton, New Jersey 08544-1000, USA.  
(pholmes@math.princeton.edu)

R. D. JAMES Department of Aerospace Engineering and Mechanics, 107 Akerman Hall,  
University of Minnesota, Minneapolis, MN 55455, USA.  
(james@aem.umn.edu)

D. KINDERLEHRER Department of Mathematical Sciences, Carnegie-Mellon University,  
Pittsburgh, PA 15213-3890, USA. (davidk@cmu.edu)

R. V. KOHN Courant Institute of Mathematical Sciences, New York University,  
251 Mercer Street, New York, NY 10012, USA. (kohn@cims.nyu.edu)

P.-L. LIONS CEREMADE, Université de Paris-Dauphine, Place Maréchal de Lattre de  
Tassigny, 75775 Paris Cedex 16, France.

T.-P. LIU Department of Mathematics, Stanford University, Stanford,  
CA 94305-2125, USA. (liu@gauss.stanford.edu)

A. MIELKE Institut für Angewandte Mathematik, Universität Hannover, Welfengarten 1,  
30167 Hannover, Germany. (mielke@ifam.uni-hannover.de)

S. MÜLLER Max-Planck-Institut für Mathematik in den Naturwissenschaften,  
Inselstr. 22–26, D-04103 Leipzig, Germany. (sm@mis.mpg.de)

D. R. OWEN Department of Mathematical Sciences, Carnegie-Mellon University,  
Pittsburgh, PA 15213, USA. (do04@andrew.cmu.edu)

P. H. RABINOWITZ Department of Mathematics, Van Vleck Hall, University of Wisconsin,  
Madison, WI 53706, USA. (rabinowitz@math.wisc.edu)

K. R. RAJAGOPAL Department of Mechanical Engineering, Texas A & M University, College  
Station, TX 77843, USA. (krajagopal@mengr.tamu.edu)

J. B. SERRIN School of Mathematics, University of Minnesota, Minneapolis, MN 55455,  
USA. (serrin@math.umn.edu)

H. F. TIERSTEN Department of Mechanical Engineering, Aeronautical Engineering, and  
Mechanics, Rensselaer Polytechnic Institute, Troy, NY 12180-3590, USA.

C.-C. WANG Department of Mechanical Engineering and Material Sciences, Rice University,  
Houston, TX 77251-1892, USA. (ccwang@rice.edu)

# Archive for Rational Mechanics and Analysis

Founded by C. Truesdell, 1958

Editors: C. Truesdell 1958–1990, J. Serrin 1967–1983, S. S. Antman 1989

**Aims and scope.** The ARCHIVE FOR RATIONAL MECHANICS AND ANALYSIS nourishes the discipline of mechanics as a deductive, mathematical science in the classical tradition and promotes pure analysis, particularly in contexts of application. Its purpose is to give rapid and full publication to researches of exceptional moment, depth, and permanence. It emphasizes (i) studies of the rational foundations of continuum mechanics, thermodynamics, and related areas, (ii) the careful analysis of significant, rationally formulated problems from the fields, and (iii) the development of pure analysis related to the fields. **fields of interest:** continuum mechanics, thermodynamics, dynamical systems, ordinary and partial differential equations, nonlinear analysis

**Copyright.** Submission of a manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, review, or thesis); that it is not under consideration for publication elsewhere; that its publication has been approved by all co-authors, if any, as well as by the responsible authorities at the institute where the work has been carried out; that, if and when the manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the (publisher, society); and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders.

All articles published in this journal are protected by copyright, which covers the exclusive rights to reproduce and distribute the article (e.g. as offprints), as well as all translation rights. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, video disks, etc., without first obtaining written permission from the publisher.

The use of general descriptive names, trade names, trademarks, etc., in this publication, even if not specifically identified, does not imply that these names are not protected by the relevant laws and regulations.

*While the advice and information in this journal is believed to be true and accurate at the date of its going to press, neither the authors, the editors, nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.*

**Special regulations for photocopies in the USA.** Photocopies may be made for personal or in-house use beyond the limitations stipulated under Section 107 or 108 of U.S. Copyright Law, provided a fee is paid. All fees should be paid to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA, stating the ISSN 0025-2611, the volume, and the first and last page numbers of each article copied. The copyright owner's consent does not include copying for general distribution, promotion, new works, or resale. In these cases, specific written permission must first be obtained from the publisher.

The Canada Institute for Scientific and Technical Information (CISTI) provides a comprehensive, worldwide document delivery service for all Springer-Verlag journals. For more information, or to place an order for a copyright-cleared Springer-Verlag document, please contact Client Assistant, Document Delivery, Canada Institute for Scientific and Technical Information, Ottawa K1A OS2, Canada (Tel.: 613-993-9251; Fax: 613-952-8423; e-mail: [cisti.docdel@nrc.ca](mailto:cisti.docdel@nrc.ca)).

## Subscription information.

ISSN: 0945-8396 (printed version)

ISSN: 1432-0630 (electronic version)

Volumes 141–145 (4 issues each) will appear in 1998.

**North America:** Recommended annual subscription rate: approx. US \$ 2166.00 (single issue price: approx. US \$ 120.00) including carriage charges. Subscriptions are entered with prepayment only. Orders should be addressed to: Springer-Verlag New York Inc., Journal Fulfillment Service Department, P.O. Box 2485, Secaucus, NJ 07096-2485, USA, Tel. 1-800-SPRINGER, Telex 00 23-125 994, Fax (201) 348-4505.

**All other countries.** Recommended annual subscription rate: DM 3325.00 plus carriage charges (Germany: DM 90.00, incl. VAT; other countries: DM 113.00). SAL or airmail charges are available upon request. SAL delivery is mandatory to Japan, India, and Australia/New Zealand). Volume price: DM 665.00; single issue price: DM 199.50, plus carriage charges. Subscriptions can either be placed via a bookdealer or sent directly to: Springer-Verlag, Karin Tiks, Postfach 14 02 01, D-14302 Berlin, Germany, Tel. (0) 30/8 27 87-3 58, Fax (0) 30/8 27 87-4 48, e-mail: [subscriptions@springer.de](mailto:subscriptions@springer.de).

**Cancellations** must be received by September 30 to take effect at the end of the same year.

**Changes of address.** Allow six weeks for all changes to become effective. All communications should include both old and new addresses (with postcodes) and should be accompanied by a mailing label from a recent issue. According to §4 section 3 of the German Postal Services Data Protection Regulations, the German Post Office can inform the publisher of a subscriber's new address even if the subscriber has not submitted a formal application for mail to be forwarded.

Subscribers not in agreement with this procedure may send a written complaint to Springer-Verlag's Berlin office within 14 days of publication of this issue.

**Back volumes.** Prices are available on request.

**Microform.** Microform editions are available from: University Microfilms International, 300 N. Zeeb Road, Ann Arbor, MI 48106, USA.

**Electronic edition.** An electronic edition of this journal is available via the LINK Information Service <http://link.springer.de> or by fax +49-6221-487-288. Would you like to automatically receive per e-mail the table of contents with direct links to the respective abstracts as soon as a new issue is available via LINK? Then take advantage of our new, free service LINK Alert. For registration and further information just go to <http://link.springer.de/alert>.

**Production.** Springer-Verlag, Journal Production Physics, Marlene Hillen, Postfach 10 52 80, D-69042 Heidelberg, Germany, Tel. +49-6221-487-181, Fax +49-6221-487-688, e-mail: [hillen@springer.de](mailto:hillen@springer.de)

**Address for courier, express and registered deliveries.** Tiergartenstrasse 17, D-69121 Heidelberg, Germany

**Typesetter.** PublicationService Gisela Koch, Wiesbaden, Germany

© Springer-Verlag Berlin Heidelberg 1998

Springer-Verlag GmbH & Co. KG, Berlin, Germany

Printed in Germany

## CONTENTS OF VOLUME 143

AFTALION, A. & J. BUSCA, Radial Symmetry of Overdetermined Boundary – Value Problems in Exterior Domains .....	195
ASTALA, K. & M. MIETTINEN, On Quasiconformal Mappings and 2-Dimensional G-Closure Problems .....	207
BASSOM, A. P., P. A. CLARKSON, C. K. LAW & J. B. MCLEOD, Application of Uniform Asymptotics to the Second Painlevé Transcendent .....	241
BUSCA, J., see AFTALION, A. ....	195
CAMASSA, R., G. KOVÁČIČ & S.-K. TIN, A Melnikov Method for Homoclinic Orbits with Many Pulses .....	105
CLARKSON, P. A., see BASSOM, A. P. ....	241
GRABOVSKY, Y., Exact Relations for Effective Tensors of Polycrystals. I. Necessary Conditions .....	309
GRABOVSKY, Y. & D. S. SAGE, Exact Relations for Effective Tensors of Polycrystals. II. Applications to Elasticity and Piezoelectricity .....	331
HEALEY, T. J. & H. C. SIMPSON, Global Continuation in Nonlinear Elasticity .....	1
KOVÁČIČ, G., see CAMASSA, R. ....	105
LAW, C. K., see BASSOM, A. P. ....	241
MAN, C.-S., On the Constitutive Equations of Some Weakly-Textured Materials .....	77
MARRIS, A. W., On Pseudo-Plane Motions .....	53
MCLEOD, J. B., see BASSOM, A. P. ....	241
MIETTINEN, M., see ASTALA, K. ....	207
MONTANARO, A., Global Equivalence for Deformable Thermoelastic Bodies .....	375
SAGE, D. S., see GRABOVSKY, Y. ....	331
SHELUKHIN, V., The Limit of Zero Shear Viscosity for Compressible Fluids .....	357
SIMPSON, H. C., see HEALEY, T. J. ....	1

TIN, S.-K., see CAMASSA, R.	105
TSAI, T.-P., On Leray's Self-Similar Solutions of the Navier-Stokes Equations Satisfying Local Energy Estimates	29
VILLANI, C., On a New Class of Weak Solutions to the Spatially Homogeneous Boltzmann and Landau Equations	273